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A CASE IN MANAGEMENT OF SPROUT HARDWOODS*

by
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This report presents results obtained through three successive measurements in a stand of sprout upland hardwoods which had been cut clean, burned and replanted to yellow poplar. The object of the work was to replace with yellow poplar, a young stand of volunteer oak, hickory, black locust and other species (Table 1). The yellow poplar planting may now be considered a failure since only about 110 yellow poplar trees per acre are alive, and the vigorous growing sprout hardwoods have completely overtopped these.

The test was made on an area of about ten acres, part of a tract owned by the Mead Pulp and Paper Company in northeastern Pike County, Ohio. The site is a southeasterly exposure, draining into Hay Hollow with about a 30 per cent gradient. The soil is of medium depth but excessively drained. The second growth had followed cutting of the merchantable stand about 40 years before. The area had been intermittently grazed, but never had been plowed. Occurrence of white oak, bitternut hickory, and walnut in the second growth stand indicates a site moist enough to grow yellow poplar, if once established.

The composition shown by the sample plot stump tally (Table 1) is a representative of the clear-cut area as a whole, since the plot was located midway up the hillside. The second growth stand which was clear cut probably contained the same species when in its original virgin condition, except for a greater number now of black locust and slippery elm.

*This test was made in cooperation with K. A. Swenning, forester for the Mead Pulp and Paper Company.

Table 1

Number of Trees# on 1/2 Acre
Plot Shown by Species and Diameter
of the Stump (Inside bark)

Stump Diameter: inside bark	White Oak	Bitternut Hickory	Black Locust	Black Oak	Black Walnut	Mockernut Hickory	White Ash	Red Elm	Black Cherry	Post Oak	All Species
1	1	3	12	3	4	9	15	7			54
2	2	5	4	12	6	10	11	2		1	53
3	10	4	8	11	3	2	9	3			50
4	7	11	6	7	2	6	5	1			45
5	2	3		2	2	1		1			11
6	4	3	1	1	1	2		1			13
7	4	1		2		2	1		1		11
8	3	6					1		1		11
9	2			1	1						4
10		1			2						3
11	1	1									2
12				1							1
13											
14											
15				1							1
	36	38	31	41	21	32	42	15	2	1	259

Standing live trees included.

The area was clear cut in 1926 except for a few selected white oaks which were reserved. The slash was piled in rows up and down the slope. A total area of about 20 acres was cleared and about half of this was burned the same year. No record was made on the part burned immediately after the cutting, since the area was first visited by members of the Central States Forest Experiment Station staff in February, 1928. At that time a plot one half acre in extent was established on the unburned part of the clear cut area. All standing trees and stumps showing sprouts were tagged with numbers except sassafras and redbud, which were plentiful over the plot, but were not expected to maintain a position in the upper crown cover of the new sprout growth. Record was made of the height and number of all sprouts on tagged stumps. The brush piles and live trees were mapped. This record showed the condition of the sprout growth two years after the cutting and before it was burned.

The ten acre tract was burned over April 5, 1928. The fire was started from the top of the hill and later from the southwest side and bottom of the slope. The fire ran before a brisk wind across and up the slope so that a comparatively clean burn resulted. Isolated live oak trees were killed in several places and several aluminum tags were partly burned on the standing trees ten to twelve feet distant from the nearest brush piles. Although the day was one of the worst fire days of a bad fire week, the fire was entirely controlled within prescribed boundaries but left the ground clear enough for easy planting. All sprout growth was killed and most of it consumed. Yellow poplar seedlings were planted on the burned area soon after the burning in the spring of 1928.

Two remeasurements of the plot have been made since its establishment. The results of the three measurements are shown in Table 2.

Table 2

Results of Three Successive
Measurements on the Tagged Plot

Species	First Measurement Spring 1928			Second Measurement Fall 1929			Third Measurement Fall 1930		
	Number Sprout Clumps	Ave. No. Sprouts	Ave. Ht.* Sprout Clumps	Number Sprout Clumps	Ave. No. Sprouts	Ave. Ht.* Sprout Clumps	Number Sprout Clumps	Ave. No. Sprouts	Av. Ht.* Sprout Clumps
Black Walnut	12	3.4	5.9	14	3.0	6.0	15	2.1	6.2
Black Oak	27	4.3	6.4	31	3.6	6.8	24	3.7	8.2
Red Elm	9	2.4	9.9	14	3.6	9.9	14	3.4	10.5
White Oak	8	3	5.6	14	3.4	6.6	26	3.2	7.2
White Ash	34	2.9	6.6	36	3.6	7.2	34	3.4	8.7
Pignut Hickory	none	none	none	1	4	5.5	1	4.0	7.5
Black Cherry	none	none	none	3	3	9.3	1	2	10.0
Post Oak	none	none	none	3	2	5.8	4	1.7	6.3
Shingle Oak	none	none	none	none	none	none	1	3	9.5
Bitternut Hickory	22	4.4	7.7	26	4.4	8.9	27	4.6	9.3
Mockernut Hickory	25	2.8	4.1	26	2.5	5.1	26	2.2	7.3
Black Locust	27	2.4	9.3	87	2.3	10.7	93	2.0	11.8
Mulberry	1	1	8.0	1	2	10.5			

*Average Ht. of Sprout Clumps is based on three dominant sprouts in each clump.

The second measurement taken after two growing seasons had elapsed subsequent to the fire, showed a vigorous sprout growth. Clumps of sprouts had appeared from roots and from seedlings started after the clear cutting. Black locust sprouts had more than doubled in number and many of these occurred where there were no visible stumps. Many slippery elm seedlings had become large enough in the first two years to send up vigorous sprouts after the fire. Redbud, sassafras, and sumach, with other shrubs and vines combined with the recorded sprout growth to form a very thick cover over the burned plot two years after the fire. The growth was much more dense and taller than that produced in two years after the cutting and before the fire. This furnishes the answer to the first objective of this study. Sprouting, under conditions existing on this area, is more vigorous after burning than following the cutting.

The third season shows a vigorous growth of sprouts in spite of the very severe drought in this section of Ohio. Black locust is now dominant over the entire hillside. Slippery elm is increasing in numbers, largely from seedlings already established when the area was burned. The oaks, white ash and bitternut hickory are growing vigorously. Mockernut hickory was injured by frost in the spring of 1930. Black walnut sprouts are not growing well and many of them will be overtopped.

At each remeasurement additional vigorous sprouts appeared on the area, probably from roots and burned seedlings. These were not attached to stumps of trees cleared before the burning.

In addition to those listed in Table 2, single sprouts as listed below were found on the half acre plot:

Additional Sprouts Recorded in the Third Measurement

Black Locust	89	Mockernut Hickory	54	Post Oak	2
Slippery Elm	34	Pignut "	11	Shingle Oak	1
White ash	22	White Oak	10	Shagbark Hickory	2
Black oak	14	Black Walnut	8		
Bitternut Hickory	13	Black Cherry	2	Sugar Maple	4

These bring the total number of good tree species sprouts up to 1024 on the half acre. Many other small seedlings or sprouts are now growing on the area but were not counted. Slippery elm is especially prevalent.

A careful count of planted yellow poplar seedlings still alive on the half acre showed 55 out of about 500 originally planted. Seven others had died during the summer. The live poplar averages 2.1 feet in height, are all spindling and lack vigor. Even though they were released by a cutting of surrounding sprouts they would probably not succeed in maintaining their lead over the new sprouts.

Summary

1. This apparently practical plan of clear cutting second growth hardwoods, burning the slash broadcast and immediately planting with yellow poplar is rendered ineffective by the vigorous growth of sprout native hardwoods.

2. The delay of two years between cutting and burning increased the number of seedlings which produced sprouts after the fire. Black locust and slippery elm in this instance made the greatest increase in number of sprouts.

Old growth hardwood of the same species would not sprout as vigorously and in such a stand, this method might have succeeded.